

### **In the Claims**

The following Listing of Claims replaces all prior versions in the application:

#### LISTING OF CLAIMS

1. (Currently Amended) A device for fusion and interfacial agitation of a diphasic system, the latter comprising first and second immiscible phases separated by an interface, this device comprising:
  - a crucible configured to contain the diphasic system and
  - a fusion and agitation mechanism configured to fuse the first and second phases and to agitate their interface, this device being characterised in that the fusion and agitation mechanism includes:
    - a power source capable of producing alternating current at a low frequency;
    - an inductor surrounding the crucible; and
    - an electrical circuit configured to supply the inductor with a variable current with first and second frequency components, the first frequency component having a high frequency which is higher than the low frequency, and being configured to melt the first and second phases, the second frequency component having the low frequency and being configured to agitate the interface of the first and second phases;
  - wherein the current of the first and second frequency components of the variable current are both generated by the power source.
2. (Previously Presented) The device according to claim 1, in which the electrical circuit is configured to provide an alternating current with the high frequency, this alternating current being modulated by the low frequency.
3. (Previously Presented) The device according to claim 2, in which the electrical circuit further comprises:
  - a capacitor forming, with the inductor, an oscillating circuit that operates at its own resonance frequency, the resonance frequency forming the high frequency;
  - wherein the power source comprises:
    - an induction generator configured to supply the oscillating circuit; and

a function generator configured to impose modulation at the low frequency and to supply a reference current to the induction generator.

4. (Previously Presented) The device according to claim 3, in which the power of the induction generator is in the interval from 10 kW to 300 kW.
5. (Previously Presented) The device according to claim 3, in which the high frequency is in the interval from 1 kHz to 20 kHz.
6. (Previously Presented) The device according to claim 3, in which the low frequency is in the interval from 0.5 Hz to 10 Hz.
7. (Previously Presented) The device according to claim 1, further comprising one or more fluid conduits in contact with the crucible for removing heat from the contents of the crucible.
8. (Previously Presented) The device according to claim 7, further comprising a resistance heater for heating the contents of the crucible.
9. (Currently Amended) The device according to claim 1, in which the frequency of the frequency component which is configured to agitate the interface of the first and second phases is chosen for the frequency component to also be configured to agitate the second phase, this second phase being above the first phase.
10. (Previously Presented) The device according to claim 1, further comprising a control mechanism configured to control thermal gradients inside the first and second phases.
11. (Previously Presented) The device according to claim 10, wherein the control mechanism comprises a screen or a susceptor.
12. (Previously Presented) The device according to claim 1, wherein the first phase is a metal and the second phase is a slag or a salt.

13. (Currently Amended) A method of using a device for fusion and interfacial agitation of a diphase system, comprising the steps of:

providing a device according to claim 1;

providing a composition within the crucible comprising a first phase and a second phase separated by an interface;

configuring the electrical circuit so that the first frequency component of the variable current is sufficient to melt the first and second phases, and the second frequency component of the variable current is sufficient to agitate the interface of the first and second phases.

14. (Previously Presented) The method of claim 13, wherein the device is the device according to claim 3.